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METHOD OF MANUFACTURE OF CONVECTIVE ACCELEROMETERS

An improved method of manufacturing convective accelerometers and tilt sensors using complementary metal-oxide semiconductor (CMOS) technology

Description

Fabricate large quantities of convective accelerometers and tilt sensor devices in standard integrated circuits by patterning temperature sensing and heater elements in parallel on a common substrate and then carrying out the maskless etching operation for all devices at the same time. Micromachining techniques have brought about many novel miniaturized accelerometer structures, although the fabrication process includes many masks and etching steps.

This fabrication process enables a concept for acceleration and tilt sensing devices which uses the acceleration of natural heat convection from heated resistive wires in a gas surrounding the device instead of measuring the acceleration of a solid proof mass. This invention integrates accelerometer devices in CMOS technology, where on-chip drive and sense circuitry are available, and overall costs are low.

Applications

- **Semiconductors (CMOS)**
Miniaturized accelerometers and tilt sensors constructed on a chip.

Advantages

- **Cost-saving**
Fabricate large quantities of convective accelerometer devices inexpensively using CMOS technology.

Abstract

A manufacturing method for convective accelerometers and tilt sensor devices using CMOS techniques. An integrated circuit chip is produced which includes a silicon substrate having an integrated circuit pattern thereon including a heater element located centrally of the substrate and at least first and second thermocouple elements located on the substrate on opposite sides of the heater element. Thereafter, portions of the substrate surrounding and beneath the heater and thermocouple elements are etched away to suspend the element on the substrate and thus to thermally isolate the elements from the substrate. The substrate is etched up to the cold thermocouple junction of the thermocouple elements so the cold junction remains on the substrate.

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References

- U.S. Patent # 6,171,880 issued 01-09-2001, expires 06/14/2019
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Status of Availability

This invention is available for exclusive or non-exclusive commercialization licensing. Collaborative research opportunities are available.

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